REMARKS

Upon entry of this amendment, claims 1, 2, 6 and 7 are all the claims currently pending in the application. Claim 5 has been canceled by this amendment, and claims 6 and 7 have been added. No new matter has been added.

I. Claim Rejections under 35 U.S.C. 103(a)

Claims 1, 2 and 5 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Gali et al. (US Re 35,643) in view of Chiang et al. (US 6,479,966), Kondo (US 6,730,428), Gali et al. (US 5,633,575) and Gelbman et al. (US 6,184,650).

Claim 1 has been amended so as to recite therein the feature previously recited in claim 5. In particular, Applicant notes that claim 1 now recites the feature of applying a negative pulse current having a short pulse width of 0.1 µs to 1 µs.

With respect to the above-noted feature, Applicant notes that the Examiner has taken the position in the Office Action that Gali ('643) discloses such a feature. Applicant respectfully disagrees.

In particular, Applicant notes that that Gali describes the use of a short duration pulse voltage signal on the order of 5 µs or less (see col. 4, lines 27-32). Thus, while Gali discloses the use of a pulse voltage signal, Applicant respectfully submits that Gali does not disclose or suggest the use of a negative pulse current having a short pulse width of 0.1 µs to 1 µs. Further, Applicant respectfully submits that the remaining prior art references applied in the Office Action do not cure this deficiency of Gali.

4

Further, with respect to the above-noted feature of applying a negative pulse current, the Examiner has taken the position that Chiang discloses the application of a negative pulse current to a battery. Applicant respectfully disagrees.

In particular, Applicants note that while Chiang discloses the use of pulse signals that are output to remove lead-acid crystal, that the pulse signals in Chiang are not negative pulse current signals. Accordingly, Applicant respectfully submits that Chiang does not disclose or suggest the above-noted feature of applying a negative pulse current. Further, Applicant respectfully submits that the remaining prior art references applied in the Office Action do not cure this deficiency of Chiang.

In view of the foregoing, Applicant respectfully submits that the cited prior art references do not disclose, suggest or otherwise render obvious the above-noted feature recited in claim 1 of applying a negative pulse current having a short pulse width of 0.1 μs to 1 μs. Accordingly, Applicant submits that claim 1 is patentable over the cited prior art, an indication of which is kindly requested.

Moreover, regarding claim 1, with respect to the claimed pulse width of 0.1 μs to 1 μs, Applicant notes that the Examiner has taken the position that this pulse width would have been obvious in view of the disclosure in Gali which describes the use of a short duration pulse on the order of 5 μs or less.

Regarding such a position, as noted by the Examiner in the Office Action, if a claimed range overlaps or lies inside a range disclosed by the prior art, then a *prima facie* case of obviousness exists (see MPEP 2144.05(I)). With respect to such a position, however, as

5

Applicant pointed out in the previous response, MPEP 2144.05(III) clearly indicates that "Applicant can rebut a presumption of obviousness based on a claimed invention that falls within a prior art range by showing ... 'that there are new and unexpected results relative to the prior art'" (emphasis added).

In this regard, Applicant notes that detailed arguments were submitted in the previous response explaining why the claimed range is critical, and how the claimed range results in new and unexpected results relative to the prior art. For the Examiner's convenience, Applicants note that the arguments presented in the previous response are summarized below.

With respect to the claimed pulse width, Applicant notes that the specification clearly indicates that a pulse width of over 1 µs is ineligible because it causes thermal oscillation in a boundary face between the membranous lead sulfate deposit and the electrode, consequently permitting the lead sulfate deposit on the electrodes to exfoliate and fall off (see page 6, lines 5-8 of the original specification).

In this regard, Applicant points out that Gali explicitly discloses that through the application of pulse signals of very short duration in the order of 5µs or less time width wise, lead sulfate deposits that have occurred on battery plate surfaces will be **released**, either going back into solution or broken up (see col. 1, lines 60-61 and col. 2, lines 2-4). Applicant has recognized, however, that there are multiple problems associated lead sulfate going back into solution and problems with broken up lead sulfate.

For example, as the lead sulfate goes back into solution, the specific gravity of the electrolytic solution may become excessively elevated, thereby resulting in damage to the polar

plates and a decrease in the life of the battery (see page 2, lines 25-27 of the original specification). Also, when the lead sulfate is broken up, the flakes fall onto the peripheries of the lower parts of the polar plates or are suspended without dissolving in the electrolytic solution. Consequently, the flakes may thus again be deposited on the polar plates of the battery during discharging (see page 2, lines 13-16 of the original specification).

Thus, Gali teaches exactly the practice Applicant has identified as being associated with the aforementioned problems.

On the other hand, as discussed above, Applicant has discovered that by utilizing a negative pulse current having a pulse width of <u>0.1 µs to 1 µs</u>, new and unexpected results are obtained, namely, that the membranous lead sulfate can be sequentially dissolved into fine particles, thereby preventing flaking.

Thus, in view of the foregoing, Applicant notes that in accordance with MPEP 2144.05 (III), which clearly states that "<u>Applicant can rebut a presumption of obviousness based on a claimed invention that falls within a prior art range by showing</u> ... '<u>that there are new and unexpected results relative to the prior art</u>'", Applicant submits that even though Gali teaches the application of a pulse width "less than 5µs", due to the <u>new and unexpected results</u> that are obtained by utilizing <u>a pulse width of 0.1 µs to 1 µs</u>, that a *prima facie* case of obviousness has been rebutted in accordance with MPEP 2144.05(III).

In response to the above-noted arguments, Applicant notes that in the present Office Action, the Examiner has stated that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to have experimented with pulse widths inside the range

of less than 5 μs known in the art to have found the optimum pulse width range" (see Office Action at page 6).

Regarding this position taken by the Examiner, Applicant notes that in the Office Action, the Examiner has relied on *In re Peterson*, 315 F.2d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003), which is quoted in MPEP 2144.05 (II)(A) as stating that "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages" (see Office Action at pages 5 and 6).

Regarding the above-noted quotation from *In re Peterson*, Applicant notes that *In re Peterson* more fully states the following:

> The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages. [citations omitted.] We therefore conclude that a prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a *prima facie* case of obviousness. That is not to say that the claimed composition having a narrower range is unpatentable. Rather, <u>the existence of overlapping or encompassing ranges shifts the burden to the applicant to show that his invention would not have been obvious</u>, as we discuss below. . . In general, <u>an applicant may overcome a *prima facie* case of obviousness by establishing "that the [claimed] range is critical, generally by showing that the claimed range achieves unexpected results</u> relative to the prior art range. That same standard applies when, as here, the applicant seeks to optimize certain variables by selecting narrow ranges from broader ranges disclosed in the prior art (emphasis added.)

Thus, as is clear from the foregoing quotation, Applicant notes that the Federal Circuit case that was relied upon by the Examiner is fully consistent with MPEP 2144.05 (III), in that

8

both the Federal Circuit case and the MPEP indicate that Applicant can <u>rebut the presumption of</u> <u>obviousness</u> based on a claimed invention that falls within a prior art range by showing that there are <u>new and unexpected results</u> relative to the prior art.

In view of the foregoing, Applicant notes that because the claimed range set forth in claim 1 results in new and unexpected results relative to the prior art, as explained above, Applicant respectfully submits that the claimed pulse width of <u>0.1 μs to 1 μs</u>, as recited in claim 1, would not have been obvious based on the prior art references applied in the Office Action.

Accordingly, Applicant respectfully submits that claim 1 is patentable over the cited prior art, an indication of which is kindly requested. As noted above, claims 2, 6 and 7 depend from claim 1 and are therefore considered patentable at least by virtue of their dependency.

II.   Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited.

If any points remain in issue, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Respectfully submitted,

Shigeo OKUNO

By: _Kenneth W. Fields_
Kenneth W. Fields
Registration No. 52,430
Attorney for Applicant

KWF/krg
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
October 6, 2008

10